FAA Standard Work Breakdown Structure (WBS)

Version 1.0

WBS Element Definitions

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Introduction

Overview

This FAA Standard Work Breakdown Structure (WBS) represents the complete set of activities that may be accomplished to provide a solution that satisfies an FAA mission need. Solutions include products and services such as hardware, software, facilities, communications services, technical assistance services, infrastructure, etc. The WBS is intended for use across FAA for developing life cycle cost estimates of solutions. It will also support management of solutions during the solution implementation and in-service management phases, and will aid in the comparison of life cycle cost estimates to actual costs that have been collected through the FAA's Cost Accounting System.

The WBS is consistent with the activities defined in the Acquisition Management System (AMS). In the WBS, Mission Analysis and Investment Analysis activities precede the formal establishment of a specific solution. The remaining elements in the WBS are activities that are directly associated with a specific solution.

The elements in the WBS represent activities; not the resources needed to accomplish the activities. The activities are arranged hierarchically; no sequence is implied, and no organizational responsibility is implied.

Applicability

This WBS is provided as AMS guidance and applies to all acquisition programs regardless of cost or appropriation. The WBS should be used for all acquisition program life cycle cost estimates and for tracking actual costs in the Cost Accounting System unless there is a rational basis for not using it (consistent with the AMS definition of guidance). The Investment Analysis Team will make this determination. If there is reason to not use the WBS, the decision will be documented in the Investment Analysis Report.

Standard WBS Structure and Definitions

1.0 Mission Analysis

The data collection and analysis activities required to quantify the agency's ability to satisfy existing and emerging demand for services.

1.1 Identify Projected Demand for Services

All activities required, including data collection, to identify and quantify projected demand for NAS services, based on diverse inputs in the form of: external demand for service and capacity; long-range plans and projections; local site trends; and performance and supportability trends of fielded equipment.

1.2 Identify Technological Opportunities

All activities required to identify and quantify projected technological opportunities that will enable the FAA to perform its mission more safely, efficiently, and effectively. These activities include review of hardware, software and systems currently available commercially or projected to be available commercially, instead of hardware, software and systems that could be custom developed for the FAA.

1.3 Identify Projected Supply of Services

All activities required to identify and quantify existing and projected supply of services based on performance and supportability data; external and internal assessments of FAA-provided services; and assessments of current and planned NAS capabilities.

1.4 Mission Needs Analysis and Assessment

All activities required to analyze, quantify and prioritize capability shortfalls (the difference between demand and supply) and technological opportunities to increase operational safety, efficiency, or effectiveness. This includes documentation of the mission analysis itself, and the preparation and approval of Mission Need Statements.

2.0 Investment Analysis

All activities required for the Investment Analysis Phase, as defined by the FAA Acquisition Management System.

2.1 Requirements Definition

All activities required to translate information in the Mission Need Statement into a Requirements Document, consistent with the Operational Concept.

2.1.1 Initial Requirements Definition

All activities required to translate information in the Mission Need Statement into an Initial Requirements Document.

2.1.2 Finalize Requirements

All activities required to finalize and approve the Requirements Document after the market analysis, analysis of alternatives, and affordability assessment.

2.2 Alternatives Identification and Analysis

All activities required to identify and analyze alternatives, including affordability assessment and all activities required for the Investment Decision.

2.2.1 Alternatives Identification

All activities required to use the initial requirements as a basis for identifying all potential material and nonmaterial solutions to the mission need, using market surveys as well as input from industry and FAA organizations that have potential solutions.

2.2.2 Alternatives Analysis

All activities required to evaluate candidate solutions by compiling and analyzing such factors as life cycle cost (including sustainment, supportability, and disposal), cost

benefits, risk, technical performance, schedule, human factors, space, real estate, heating and cooling, power, telecommunications, physical infrastructure, training, environmental impact, security, radio frequency spectrum, logistics support, compatibility with NAS Architecture, regulatory and procedural impact, operational suitability, and disposal of obsolete assets.

All activities required to assess the affordability of each candidate solution against all other programs in the NAS baseline.

All activities required to document the results of the investment analysis in the Investment Analysis Report. The report defines each candidate solution to a mission need, including an Acquisition Program Baseline for each candidate solution, and compares the relative strengths and weaknesses of each for all evaluation factors considered during investment analysis.

All activities required for the Joint Resources Council (JRC) to select the solution at the investment decision, based on information in the Investment Analysis Report.

3.0 Solution Development

All activity required for the Solution Development, e.g., hardware system, software, facility, physical infrastructure, and telecommunications. This includes all activities associated with initial development, modifications, upgrades, and pre-planned product improvements.

3.1 Program Management

Business and administrative planning, organizing, directing, coordinating, controlling, and approval actions designed to accomplish overall program objectives.

3.1.1 Work Planning, Authorization, and Management

All activities required to develop the strategy for implementing and executing the overall program.

All activities required to plan, authorize and manage all actions and activities that must be accomplished for successful program development which includes preparation of the Acquisition Strategy Paper and Integrated Program Plan and project-specific input to agency-level planning documents, such as the call for estimates and the NAS architecture.

3.1.2 Program Control

All activities required to ensure that all cost, schedule, performance, and benefit objectives are met. Risk and requirements management activities are also included.

3.1.3 Contract Management

All activities required to award and manage project-related contracts.

3.2 System Engineering

All technical and management activities associated with a specific solution. These activities include directing and controlling a totally integrated engineering effort of a solution.

3.2.1 System Requirements and Definition

System engineering activities to transform the performance requirements of an approved Acquisition Program Baseline (APB) into specifications and a preferred solution configuration. This system engineering effort, which is applicable to each component of the solution throughout all phases, includes developing and maintaining design criteria and preparing and maintaining system-level data flows, block diagrams, change proposals and documentation trees.

3.2.2 Analysis, Design, and Integration

Overall analysis, design and integration of the solution, e.g., hardware system, software, facility, telecommunications. Includes design integrity analysis, intra- and inter-system compatibility assurance (interface identification, analysis and design),

and the integration and balancing of reliability, maintainability, producibility, safety, and survivability. Design includes allocating functions to appropriate elements (e.g., hardware, software, telecommunications, user functions, services, facilities, etc.), and presenting prepared design information at identified design reviews.

3.2.3 Value Engineering

All activities involved in analyzing current designs verses alternative designs in order to quantify the value added and cost reduction of alternative architectures.

3.2.4 Supportability, Maintainability, and Reliability Engineering

All engineering activities and analyses undertaken during solution development as part of the engineering and design effort, to assist in complying with supportability and other logistics support objectives.

All maintenance planning activities required to measure the ability of an item or solution to be retained at or restored to a specific condition of readiness.

All activities associated with reliability engineering, defined as the engineering process required to examine the probability of a solution performing its mission adequately over the intended period of time and under expected operation conditions.

3.2.5 Quality Assurance Program

All activities associated with development of planning, procedures, examinations, and tests required during procurement, production, receipt, storage, and issue that are necessary to develop the solution in accordance with identified standards and specifications.

3.2.6 Configuration Management

All activities associated with the establishment, monitoring and administration of change control procedures, including collection, processing, distribution and tracking of modification request forms, establishment and administration of change control boards, and formal audits to compare product to documentation. Includes configuration management of hardware, software, facilities, data, interfaces, tools, and documentation.

3.2.7 Human Factors

All activities required to define, as a comprehensive technical and engineering effort, the integration of doctrine, personnel, material, operational effectiveness, human characteristics, skill capabilities, Occupational, Safety and Health (OSH) and training.

3.2.8 Security

All engineering activities and tasks associated with security requirements and issues (information security, physical security, personnel security, etc.).

3.3 HW/SW Design, Development and Production

All activities required to design and develop hardware and software configuration items at the development facility, and the resulting integration, testing, assembly, checkout, and production.

3.3.1 Hardware Design and Development

All activities associated with detailed design, fabrication, assembly and checkout of all Hardware Configuration Items (HWCIs) of the initial unit(s).

3.3.2 Software Design and Development

All activities associated with the detailed design, prototyping, development and unitlevel checkout of all Computer Software Configuration Items (CSCIs). A CSCI is an aggregation of software, or any of its discrete portions which satisfies an end use function and has been designated for configuration management.

3.3.3 HW/SW Integration, Assembly, Test and Checkout

All activities associated with development site integration, assembly, and checkout of hardware, software and telecommunications components . Included are interface materials and parts required for the in-plant integration and assembly into the system

within a suppliers' facilities, and all materials and parts or other interfacing equipment furnished by the integrating agency or contractor.

3.3.4 Production Engineering

Engineering activities involved in taking the development system to production. This includes developing and maintaining production process documentation.

3.3.5 Production

All activities associated with full-scale production necessary to fulfill quantity requirements for solution implementation, including procurement of COTS or NDI. Includes all activities related to contractor-conducted testing performed on each end item before it leaves the factory to verify that the end item conforms to applicable specifications, and is free from manufacturing defects. Includes any non-recurring production start-up costs associated with the production of the solution such as facility expansion or construction, retooling or production equipment acquisition or modification, etc.

3.4 Facilities and Physical Infrastructure Design and Development

All national (non site-specific) activities associated with design and development of facilities and physical infrastructure.

3.4.1 Facility Planning and Design

All activities associated with translating facility requirements to national level A&E facility design, and planning and programming to accommodate site-specific needs. Includes design of lighting, space, environment, heating, ventilation, air conditioning, grounding, bonding, shielding, lightning protection, cabling, etc.

3.4.2 Real Estate

All activities associated with determining real estate needs and national level planning and programming for acquisition.

3.4.3 Physical Infrastructure

All activities associated with translating physical infrastructure requirements to national level designs, and planning and programming to accommodate site-specific needs. Includes design of telecommunications, power systems and commercial power, water and sewage systems, etc. Also includes activity associated with national purchases.

3.5 Test and Evaluation

All testing and evaluation activities necessary to verify and validate that products meet specifications, satisfy requirements and are operationally suitable and effective.

3.5.1 System Development Test and Evaluation

All activities associated with test and evaluation conducted to demonstrate that all engineering design and development activities are complete, and that the system will meet specifications. Development test and evaluation includes contractor and inhouse activities associated with this effort, e.g., software validation and verification. All support activities (e.g. technical assistance, maintenance, labor, material, support elements and testing spares, etc.) required during this phase of testing are included.

Development and construction of those special test facilities, test simulators, testbeds and models required for performance of the developmental tests necessary to prove the design and reliability of the system or subsystem.

3.5.2 System Operational Test and Evaluation

All activities associated with test and evaluation conducted to assess the prospective system's utility, operational effectiveness, operational suitability, and logistics supportability (including compatibility, interoperability, reliability, maintainability, logistics requirements, etc.). All support activities (e.g. technical assistance, maintenance, labor, material, support elements and testing spares etc.) required during this phase of testing are included.

All activities associated with development and construction of those special test facilities, test simulators, testbeds and models required for performance of the operational tests necessary to prove the system's utility, operational effectiveness, operational suitability, and logistics supportability.

3.5.3 System Independent Software Verification and Validation

All activities performed by organizations other than the developer to determine the degree to which the software fulfills the specifications. Formal verification is a vigorous mathematical demonstration that source code conforms to its requirements. Validation is concerned with evaluation of a software product at the end of the development process to determine compliance with product requirements.

3.5.4 Site Acceptance Testing

All activities associated with contractor-conducted testing performed at field site(s) to verify that the new system is installed and operating properly.

3.5.5 Independent Operational Test and Evaluation

All activities associated with independent tests and oversight conducted by organizations other than the developer in a realistic environment to confirm the operational readiness (suitability and effectiveness) of FAA systems to become part of the NAS. Includes all support activities.

3.6 Documentation

All activities associated with production, delivery and review of FAA programmatic documents and contractor documentation deliverables. Included are managing, coordinating, editing, scheduling, auditing and assembly of the documents and review packages necessary to the functioning of the program. It includes acquiring, writing, assembling, reproduction, packaging and shipping the data. It also includes the activities involved in converting data from contractor format into government format, as well as reproducing and shipping the data.

3.7 Support

All activities associated with the acquisition of test and measurement equipment, support and handling equipment, support facilities, initial spares and repair parts and training required to support and maintain the system or portions of the system through the complete delivery of the solution, but not directly engaged in the performance of the system mission.

3.7.1 Logistics Support Planning

All planning activities associated with fulfilling the requirements to provide logistics support to the solution.

3.7.2 Test and Measurement Equipment Acquisition

All activities associated with the acquisition of test and measurement equipment which is used to evaluate operational conditions of a system or equipment at all levels of maintenance. It includes the test measurement and diagnostic equipment, precision measuring equipment, automatic test equipment, manual test equipment, automatic test systems, test program sets, appropriate interconnect devices, automated load modules, tap(s), and related software, firmware and support hardware. Packages which enable line or shop replaceable units, printed circuit boards, or similar items to be diagnosed using automated test equipment are also included.

3.7.3 Support and Handling Equipment Acquisition

All activities associated with acquiring tools and handling equipment used for support of the mission system. Equipment typically included is ground support equipment, vehicular support equipment, powered support equipment, materiel handling equipment, and software support equipment, both hardware and software.

3.7.4 Support Facilities Construction / Conversion / Expansion

All activities associated with construction, conversion, or expansion of support facilities for training, testing, inventory, contractor and FAA depot maintenance, hazardous waste management, etc. required for the specific system.

3.7.5 Support Equipment Acquisition / Modification

All activities associated with acquisition or modification of support equipment or software for training, testing, inventory, contractor and FAA depot maintenance, hazardous waste management, etc. required for the specific system.

3.7.6 Support Facilities and Equipment Maintenance

All activities associated with maintenance of support facilities and equipment for training, testing, inventory, contractor and FAA depot maintenance, hazardous waste management, etc. required for the specific system prior to the in-service decision.

3.7.7 Initial Spares and Repair Parts Acquisition

All activities associated with the acquisition, provisioning, packaging, handling, storage and transportation of deliverable spare components, assemblies and subassemblies used for initial replacement purposes in the system hardware. Includes the repairable spares and repair parts required as initial stock to support and maintain newly fielded systems or subsystems, including pipeline quantities, during the initial phase of service at all levels of maintenance and support.

3.7.8 Initial Training

All activities associated with designing, developing, and delivering training services, aids, and materials used to train site technicians, depot technicians, engineers, air traffic controllers, and other personnel.

4.0 Implementation

All activity required for the site planning and preparation through commissioning.

Note: Site Acceptance Test (SAT) activities are not captured here, but are in section 3.5 Test and Evaluation.

4.1 Program Management

Business and administrative planning, organizing, directing, coordinating, controlling, and approval actions designed to accomplish overall program objectives.

4.1.1 Work Planning, Authorization, and Management

All activities required to plan, authorize and manage all actions and activities that must be accomplished for program implementation including preparing project-specific input to agency-level planning documents, such as the call for estimates and the NAS Implementation Work Plan. This includes all activities associated with security control.

4.1.2 Program Control

All activities for ensuring that all cost, schedule, performance, and benefit objectives are met.

4.1.3 Contract Management

All activities associated with the award and management of project-related contracts.

4.2 Engineering

All engineering activities associated with the plants site surveys, design, analysis, and studies. This includes civil, electrical, mechanical, architectural, industrial, and other "non-electronic" plant type engineering positions. This includes drafting, airspace studies, coordination with applicable organizations, and development of plans and specifications.

All electronics engineering activities associated with the electronics installation design, analyses, and studies. This includes spectrum analysis, coordination with sponsoring organizations, and development of installation drawings.

All physical integration activities associated with site modification requirements to ensure that product integrates into the NAS. This includes all activities to assess site conditions, the current product's physical requirements, and transition requirements.

All engineering activities associated with achieving both transition and operational requirements for physical security.

4.3 Environmental and Occupational Safety and Health Compliance

All activities associated with satisfying environmental, occupational safety and health and hazardous materials laws and regulations for the program and its products. This includes environmental impact statements, assessments, Due Diligence Audits, and Occupational Safety and Health (OSH)-related activities.

4.4 Site Selection and Acquisition

All activities including real estate, initial analysis, data gathering, identifying candidates, analyzing, coordinating, testing, and providing final recommendations for site approval. This includes coordination with all applicable organizations, unions, and the public.

All activities associated with acquiring real estate. This includes development and review of property maps, appraisals, title searches, etc.

4.5 Construction

All activities associated with actual construction or modification of a site. This includes all activities to execute, control, schedule, quality control, and secure plant equipment and utility services to ensure the site meets requirements and provides a safe environment for its life cycle.

All activities associated with the implementation of telecommunications services required to achieve full operational capability.

4.6 Installation and Checkout

All activities associated with installation and checkout of hardware, software, and equipment at the site in order to achieve operational status. This includes coordination with all applicable organizations, unions and the public during installation and transition.

4.7 Commissioning/Closeout

All activities associated with preparing for and achieving full operational capability (FOC), JAI, service availability, and commissioning. This includes operational procedure development or modification, field familiarization activities, preliminary and final commissioning, flight inspections, and other applicable testing.

All activities associated with clean-up activities required after the new system has been commissioned. This includes capitalization of F&E projects, resolution of joint acceptance inspection (JAI) exceptions, and the update and submittal of redlined facility drawings.

4.8 Telecommunications

All initial activities required to fully implement telecommunications services required to achieve full operational capability.

4.9 Implementation Training

All activities associated with development and delivery of initial, refresher, and attrition training for implementation personnel.

5.0 In-Service Management

All activities required for the In-Service Management Phase.

Includes all activities associated with directly operating, providing maintenance functions (both scheduled and unscheduled), or furnishing technical or logistics support for maintenance of FAA systems, sub-systems, services or equipment. It also includes associated travel time required to support the system.

5.1 Preventive Maintenance/Certification

All activities associated with preventive maintenance of hardware and software to include activities specific for certification.

5.2 Corrective Maintenance

All activities associated with corrective maintenance of hardware and software. This also includes activities related to packaging and shipping components to depot-level repair facilities.

5.3 Modifications

All activities associated with implementation of modifications to in-service hardware and software.

5.4 Maintenance Control

All activities associated with providing oversight/coordination in operating and maintaining the NAS infrastructure.

5.5 Technical Teaming

All activities associated with the investigation and resolution of general technical issues relating to system performance.

5.6 Shift Augmentation

All additional activity associated with meeting 'watch standing' coverage beyond stated staffing requirements.

5.7 Program Support

All administrative activities associated with planning, organizing, managing, and directing actions required in support of operating and maintaining the solution.

5.7.1 Work Planning, Authorization and Management

All activities required to plan, authorize and manage all actions and activities that must be accomplished for operation and maintenance of the solution. This includes preparing project-specific input to agency-level planning documents, such as the call for estimates and NAS architecture. This includes all activities associated with security control.

5.7.2 Program Control

All activities required to ensure that all cost, schedule, operational performance, and benefit objectives are met. Risk management activities are also included.

5.7.3 Contract Management

All activities associated with the award and management of solution-related contracts, such as logistics contracts, service management contracts, equipment repair contracts and maintenance contracts.

5.8 Logistics

All activities associated with providing logistics support for the system.

5.8.1 Supply Support

All activities associated with ordering, receiving, tracking, sending, etc. supplies needed in order to operate and maintain the solution. This also includes activities related to Packaging, Handling, Storage and Transportation (PHS&T) for materials needed to support the solution. This also includes inventory management and cataloging.

5.8.2 Repair

All activities associated with depot-level repair of equipment in support of the solution. This does not include costs incurred at the site.

5.8.3 Support Equipment Maintenance

All activities associated with replenishment, maintenance, and calibration of support equipment.

5.8.4 Warranty Tracking

All activities associated with managing warranties.

5.9 In-Service Training

All activities associated with Attrition Training and Refresher Training of personnel who directly operate, maintain, or provide support functions of the solution. This does include contractor provided costs as associated with specific training.

5.10 Second Level Engineering

All engineering activities in support of the delivery of service, to include development of modifications, documentation and configuration management. Includes evaluation of potential technology refresh.

5.11 Infrastructure Support

Maintenance and operations of leased and owned buildings, structures, grounds, roads, support vehicles for operational systems or people who support or operate those systems.

5.11.1 Hazardous Materials Handling

All activities associated with providing pollution prevention and hazardous waste management and remediation.

5.11.2 Utilities, Building and Grounds Upkeep and Maintenance

All activities associated with efforts to routinely maintain, modernize, and relocate the buildings, structures, roads, grounds and support equipment.

Recurring costs of utilities (water, electric, gas, oil, etc.) used to provide heat, air conditioning, and water to sites.

5.11.3 Telecommunications

All activities associated with maintaining, upgrading or modifying operational and administrative communications services required for the operation and maintenance of the solution.

5.11.4 Building and Infrastructure Improvements

All activities associated with efforts to upgrade the buildings, structures, roads, and support equipment; i.e. to provide bonding, grounding, lightning protection, heating, cooling, and special access.

5.11.5 Real Estate Acquisition and Management

Purchase or leasing of buildings, structures and grounds in which the operational systems or the people who support or operate systems are located. All activities associated with management of FAA-owned or leased properties.

5.12 Flight Inspections and SIAP Development

All activities associated with flight inspections of the solution, and the development and revalidation of Standard Instrument Approach Procedures (SIAP).

5.13 System Performance Assessment

All activities associated with assessing equipment and system performance and trends, to include metrics development, data collection and trend analysis.

5.14 System Operations

All non-maintenance activities associated with directly operating or monitoring the solution. This includes computer operations, system administration, etc.

6.0 Disposition

All activities required for the disposal management, dismantling/demolition/removal, restoration, and salvage of decommissioned equipment, systems or sites.

6.1 Program Management

All activities required to manage the termination of a decommissioned system or equipment. This effort includes the planning, documentation, coordination, and inspection of decommissioned systems or equipment.

6.2 Decommissioning

All activities required for notices and coordination with all stakeholders on impending decommissioning. Stakeholders include both agency and public organizations.

6.3 Engineering

All engineering activities associated with designs for dismantling, demolition, and or removal of commissioned systems or equipment.

6.4 Environmental

All activities for end-state environmental assessments and cleanup, abatement, and disposal of only hazardous materials as stipulated by laws and regulations.

6.5 Dismantle/Removal

All physical activities associated with the dismantling, demolition and removal of the decommissioned system or equipment.

6.6 Site Restoration/Closeout

All cosmetic activities necessary to restore a site to original acceptable condition as well as all final activities required after site has been restored to acceptable/original condition. This activities include necessary action to revert real estate to owner and close project.